CLOVER DEFOLIATION BEFORE SPRAYING WITH 2,4-D AND ITS EFFECT ON CLOVER RECOVERY

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SUMMARY

Three trials were carried out on sheep-grazed pasture. Different plots, all containing clover, were ungrazed lightly grazed or hard grazed. Half of each plot was boom sprayed with 1 kg 2,4-D ester/ha. Hard grazing treatments reduced the clover content of the pastures and 2,4-D also reduced clover content. There was no evidence that either light or hard grazing before spraying 2,4-D helped to speed clover recovery. In one trial the damaging effect of 2,4-D on clover was increased by hard grazing before treatment.

INTRODUCTION

It is well known that spraying of pastures with hormone weedkillers such as MCPA or 2,4-D damages clovers and temporarily reduces pasture production and quality (Meeklah 1958). A common recommendation is that the amount of clover leaf should be at a minimum at the time of spraying so that it presents the least possible area for herbicide absorption. On a farm scale this is best achieved by hard grazing before spraying (Lynch 1954; Meeklah 1958). New Zealand 2,4-D and MCPA labels recommend grazing the area before spraying to reduce the clover leaf and to expose the weeds to more complete spray coverage.

The trials described below were designed to look at the effect of grazing before spraying on subsequent clover damage and recovery.

MATERIALS AND METHODS

Three trials, carried out in 1980-81 on sheep-grazed pasture, were similar in design. Main plot treatments were three levels of grazing — (1) ungrazed (no defoliation), (2) lightly grazed to remove most clover leaves, (3) hard grazed to remove all clover leaf and most stolons. After grazing, half of each main plot was treated with 2,4-D ester at 1 kg/ha. Herbicide was applied in 220 litres/ha at 200 kPa, using a propane knapsack sprayer and a 1.5 m hand held boom.

All trials were left ungrazed for 3-4 weeks before the experiments started. Pasture frames were used to exclude stock from ungrazed plots. There were 10 replicates of each main plot. The size of main plots was 1.5 x 3.3 m, with 2 m buffer strips between plots.

Assessment of clover content of each sub plot was made by point analysis (100 points per plot), by visual assessment of clover content on a 0 to 10 scale (with 0 being no clover and 10 being 100% clover cover) or by cutting pasture in a 0.5 x 1 m quadrat to ground level for dry matter analysis and herbage dissection.

Trial details are shown in Tables 1-3. Trials A and B were in different paddocks. In trials A and B the pasture consisted of ryegrass (*Lolium perenne*) and white clover (*Trifolium repens*). In trial C, the pasture consisted of white clover, subterranean clover (*Trifolium subterraneum*) and a mixture of grasses including ryegrass, sweet vernal (*Anthoxanthum odoratum*), browntop (*Agrostis tenuis*), poa annua (*Poa annua*), bromus mollis (*Bromus mollis*) and Yorkshire fog (*Holcus lanatus*). In trial C in late March, grass grub (*Costelytra zealandica*) damage was evident in all plots and large numbers of subterranean clover seedlings were present.

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RESULTS

Results of clover assessments in trial A are shown in Table 1. At 13 days after spraying clover content was highest in the ungrazed plots and lowest in the hard grazed. 2,4-D reduced the clover content in all grazing treatments. By 9th May, 50 days after spraying, differences between initial grazing treatments had largely disappeared but the

TABLE 1: Clover assessment in trial A at Hauorongo Field Research area sprayed 20.3.80. Interactions between grazing and spray treatments were not significant so that only main effects are shown.

	Pre-spray treatment				
	Ungrazed	Lightly grazed	Hard grazed	Unsprayed	2,4-D
Pre-spray pasture ht/(cm)	10	6.5	1.5		
White clover hits /100 points 2.4.80	44	32	20	38	26
LSD (5% level)		9.9		5.2	
Visual scores 9.5.80	5.5	5.3	4.8	5.8	4.5
LSD (5% level)		0.80		0.54	
Visual scores 24.6.80	3.3	2.8	2.7	3.4	2.4
LSD (5% level)		0.76		0.39	

Stock used — lambs
Grazing dates — light grazing 13-14.3.80
hard grazing 13-17.3.80
Subsequent stocking — lightly set stocked 3.4.80 onwards.

TABLE 2: Clover assessments and dry matter yields in trial B at Hauorongo Field Research Area sprayed 26.12.80. Interactions were not significant so that only main effects are shown.

	Pre-spray treatment				
	Ungrazed	Lightly grazed	Hard grazed	Unsprayed	2,4-D
Pre-spray pasture ht/(cm)	10	6	1.5		
White clover hits /100 points 14.1.81	55	50	32	57	34
LSD (5% level)		5.9		6.0	
Total DM* yield (kg/ha) 6.1.81 - 24.2.81	2108	1638	1541	1860	1665
	(22)	(16)	(13)	(17)	(16)
LSD (% level)		251		213	
White clover hits /100 points 15.4.81	39	41	37	41	37
LSD (5% level)		7.5		6.0	

Stock used — hoggets
Grazing dates — light grazing 16-18.12.80
hard grazing 16-23.12.80
Subsequent stocking — grazed to even height (3cm) on 5-6.1.81:
lightly set stocked 25.2.80 onwards.
* % white clover, bulked over all reps, in brackets.

effect of the herbicide treatment was still significant. Similar results were obtained on 24th June. On 29th July, 129 days after spraying, clover content of all plots was similar.

Table 2 shows the results of clover assessments and dry matter yields of trial B. At 19 days after spraying clover content was affected by both the grazing treatment and herbicide. Dry matter yields, measured at 60 days, were highest in treatment 1, the initially ungrazed plots: 2,4-D applications did not significantly affect yields. The amount of clover tended to be highest in the ungrazed plots although there was little difference between the sprayed and untreated plots. These results could not be statistically analysed as samples had been bulked. Point analysis at 110 days showed that the effects of both grazing and herbicide application were no longer significant.

The results of trial C are shown in Table 3. At the first assessment, 70 days after spraying, both grazing and 2,4-D had affected the clover content, and the interaction was significant. In the initially ungrazed plots, 2,4-D had not affected clover content, whereas 2,4-D reduced clover content in both the grazed treatments. In the unsprayed plots, clover content was highest in the plots which had been lightly grazed. At 79 days, both 2,4-D and hard initial grazing reduced dry matter yields. Clover content appeared to be least in the hard grazed plots. Again, this could not be analysed. At 107 days neither 2,4-D nor grazing had any effect on clover content.

TABLE 3: Clover assessments and dry matter yields in trial C at Takapau Field Research Area. Sprayed 20.1.81 Interactions between grazing and spray treatments were significant (5% level) in point analysis results of 31.3.81, but not in other assessments.

		Pre-spray treatment			Mean
		Ungrazed	Lightly grazed	Hard grazed	
Pre-spray pasture ht (cm)		10	3-5	1.5-2	
White + subterranean clover hits /100 points on 31.3.81	unsprayed	9.4	17.0	10.4	12.3
	2,4-D	11.5	11.3	6.4	9.7
	LSD (5% level)		3.8		2.2
	mean	10.5	14.2	8.4	
	LSD (5% level)		5.24		

	Pre-spray treatment				
	Ungrazed	Lightly grazed	Hard grazed	Unsprayed	2,4-D
Total DM* yield (kg/ha) 13.2.81-9.4.81	2392 (5.0)	2105 (5.5)	1738 (2.5)	2208 (5.7)	1948 (3.0)
LSD (5% level)		318		242	
White + subterranean clover hits /100 points on 7.5.81	6.1	5.3	4.4	5.8	4.6
LSD (5% level)		1.74		1.69	

Stock used — ewes
Grazing dates — light grazing 12-15.1.81
hard grazing 12-17.1.81
Subsequent stocking — grazed to even height (3 cm) on 6-13.2.81
lightly set stocked 10.4.81 onwards.
* % white + subterranean clover, bulked over all reps in brackets.

DISCUSSION AND CONCLUSION

In all cases 2,4-D reduced the clover content of the sward and, in trial C decreased dry matter production. However, by 4 months after spraying, clover content had recovered to that of the untreated levels. Hard grazing itself had a marked effect on the rate of clover recovery, although the time taken for this effect to disappear varied between trials. The absence of significant interactions between 2,4-D and grazing effects in trials A and B and in two out of three assessments in trial C indicates that 2,4-D had a similar effect on clover content in all 3 grazing treatments and that the recovery of clover was not therefore affected by grazing before spraying. At the first assessment in trial C, clover damage caused by 2,4-D was greater where the pasture had been grazed beforehand.

There is therefore no evidence to support earlier claims that hard grazing of clover before spraying with 2,4-D helps to improve clover recovery. However, as the effect of pre-spray grazing on weed control was not examined in these trials, it is possible that in some cases grazing, to expose weeds which would otherwise be hidden by vegetation, may help to achieve better weed control.

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